REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 19-33, and 37-51 are presently active in this case. Claims 19, 23-24, and 26-27 are amended, Claims 37-51 are added, and Claims 34-36 are cancelled without prejudice or disclaimer by the present amendment. Support for the amendment can be found at least at page 1, line 7, and page 6, lines 10-14, of the specification. Thus, it is respectfully submitted that no new matter is added.

Applicants respectfully note that the Abstract is amended to correct minor informalities. Further, the specification is amended to recite a "ferroelectric material" throughout, and Claims 19 and 23 are amended to correspond to the amendments to the specification.

In the outstanding Office Action, Claims 19-20, 24, 26, 28, and 32-33 were rejected under 35 U.S.C. § 102(a) as anticipated by Fujie, et al. (U.S. Patent No. 5,025,187, herein "Fujie") or Petermann (U.S. Patent No. 2,875,355). For the reasons discussed below, Applicants respectfully traverse the art rejection.

Amended Claim 19 is directed to an acoustic wave device including a layer of ferroelectric material and a substrate. Further, the layer of ferroelectric material includes a positive first polarization domain and a negative second polarization domain, and *a pitch between the first polarization domain and the second polarization domain is less than 1000 nm*. Moreover, the features of Claim 19 are recited to advantageously provide an acoustic wave device suitable for high-frequency applications.

In a non-limiting exemplary embodiment, FIG. 1 illustrates a process for creating a surface wave device including a positive polarization domain D1 and a negative polarization domain D2 within a layer C of ferroelectric material. As described at page 6, lines 10-14,

such a device with a pitch on the order of a few hundred nanometers results in a structure suitable for high-frequency applications.

Fujie describes an actuator control system, where the actuator may be a piezoelectric device and the control system operates the device in a predetermined vibratory manner to remove a foreign substance from a mirror-like surface (see Abstract). As noted in the Office Action, Figs. 7-9 of Fujie illustrate a piezoelectric element 55 of a piezoelectric device/vibrator 50/20 having two portions which are oppositely polarized (see also Col. 5, lines 19-20). The piezoelectric device 50/20 is adhered to the middle of the mirror 11 to repeatedly bend a mirror 11, thus removing water droplets from the reflecting surface 11b of the mirror 11 (Col. 5, lines 16-64). Alternatively, Petermann describes an ultrasonic zone plate focusing transducer including odd active zones 49 and even active zones 50, where adjacent zones are oppositely polarized (see Col. 5, lines 32-39, and Fig. 7). Fig. 15 of Petermann illustrates a rectangular-shaped ultrasonic zone plate focusing transducer. However, as discussed in greater detail below, neither Petermann nor Fujie teach or suggest all limitations recited in amended Claim 19.

In particular, piezoelectric device 50/20 of Fujie is controlled by a voltage controlled oscillator 45 with a frequency between 70 and 80 kHz, corresponding to a preferable range for the self-cleaning plate shaped device, since it is desirable for the dimensions and shape of the piezoelectric device 50/20 to be selected based on the resonant frequency of the mirror (see Col. 4, lines 28-38). A higher resonant frequency of about 720 kHz is also described (Col. 8, lines 15-19 and lines 49-55), but this higher frequency is still much less than even one gigahertz (GHz). As the dimensions of the piezoelectric device 50/20 correspond substantially to its resonant frequency, the lower frequencies of operation taught by Fujie suggest that the described piezoelectric device 50/20 includes a pitch greater than the 1000 nm claimed by Applicants.

Furthermore, Table 1 at Col. 3 shows a diameter of a piezoelectric element 23 as 30 mm, suggesting a minimum pitch between polarized portions on the order of several *millimeters* when this dimension is taken in the context of Fig. 7b (showing a pair of the positive polarized portion and negative polarized portion arranged in series). Thus, a pitch between adjacent oppositely polarized portions of the piezoelectric element of Fujie is explicitly taught to be greater than 1000 nm (one *micrometer*). Therefore, in light of the suggestion and teachings of Fujie, this reference does not teach or suggest all limitations of amended Claim 19.

Petermann describes dimensions applicable to any type of zone plate focusing transducer such as the transducers of Figs. 2, 4, 5, 7, 15 or 16 (Col. 4, lines 65-73). The smallest zone, the central zone transducer 72, is taught to have a lateral dimension, D1, of 2.04 cm. Additionally, the lateral distance between the two outer edges of transducers 73, D2, measured across the central zone transducer 72, is noted as 2.90 cm. Therefore, as in Fujie, the pitch of such a device would be on the order of several *millimeters*. Thus, adjacent oppositely polarized zones of Petermann are taught to have a pitch significantly greater than 1000 nm.

Accordingly, Applicants respectfully request the withdrawal of the art rejections based on Fujie or Petermann.

Claims 23, 25, and 27 were rejected under 35 U.S.C. § 103(a) as unpatentable over Fujie or Petermann in view of Banno, et al. (U.S. Patent No. 5,259,099, herein "Banno"), Dias (U.S. Patent No. 5,291,090), or Gounji, et al. (U.S. Patent No. 4,633,204, herein "Gounji"). Claims 29-31 were rejected under 103(a) as unpatentable over Fujie or Petermann. For the reasons discussed below, Applicants respectfully traverse the obviousness rejections.

As described above, neither Petermann nor Fujie teach or suggest that a pitch between

a positive first polarization domain and negative second polarization domain is less than 1000 nm. It is respectfully submitted that not one of secondary references Banno, Dias, or Gounji teach or suggest at least the noted feature.

In particular, Banno is silent with regard to a pitch between a first rod 21 and a second rod 22 dispersed in a matrix 23 being less than 1000 nm. Additionally, Dias explicitly teaches a linearly increasing pitch from 0.0268 nm (between electrodes 121 and 122) to 0.0282 nm (between electrodes 127 and 128), with an average pitch of 0.0275 nm, this pitch configuration being optimized for an operating frequency range from 41 MHz to 39 MHz, centered on 40 MHz (see Col. 5, lines 50-55, and Col. 6, lines 10-38). Moreover, it is respectfully submitted that Gounji is silent with regard to a pitch between polarized regions 41, 42, 43 ... 4N of an electric ceramic vibrator 40, 50 being less than 1000 nm (for example, see Figs. 11 and 13). Further, as Gounji describes a vibrator for a mechanical filter for INS or ISDN, the desired resonance frequency of the filter is taught to be 200 and 320 kHz respectively. In light of the above discussion regarding Fujie, the target resonance frequency in Gounji suggests that a pitch between polarized regions 41, 42, 43, ... 4N is greater than 1000 nm. Therefore, not one of Dias, or Gounji remedy the above-noted deficiencies of Petermann or Fujie with respect to Applicants' amended Claim 19.

Accordingly, Applicants respectfully request the withdrawal of the obviousness rejections.

Claims 19-33 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. For the following reasons, Applicants respectfully traverse this rejection.

As described above, the specification and claims are amended to replace instances of "ferromagnetic" with "ferroelectric," thereby addressing the Examiner's concerns noted at pages 3-4 of the outstanding Office Action. Therefore, it is respectfully submitted that the rejection under 35 U.S.C. § 112, second paragraph, is rendered moot by the present

amendment.

Accordingly, Applicants respectfully request the withdrawal of the indefiniteness rejection.

New Claim 37 is considered allowable as it recite features of the invention that are neither disclosed nor suggested by the references of record. In particular, Claim 37 is directed to an acoustic wave device including a layer, the layer including a ferroelectric material. Further, the layer includes a positive first polarization domain and a negative second polarization domain, and *a pitch between the first polarization domain and the second polarization domain corresponds to a frequency of greater than one gigahertz.* Support for the new claims are found at least at page 1, lines 6-7 and page 6, lines 10-14, of the specification. Thus, it is respectfully submitted that no new matter is added by the new claims.

Dependent Claims 20-33 and 38-51 are considered allowable for the reasons advanced for Claims 19 and 37 from which they respectfully ultimately depend. These claims are further considered allowable as they recite other features of the invention that are not disclosed, taught, or suggested by the applied reference when those features are considered within the context of independent Claim 19 and 37.

Consequently, in view of the above discussion, it is respectfully submitted that the present application is in condition for formal allowance, and an early and favorable reconsideration of this application is therefore requested.

Respectfully submitted,

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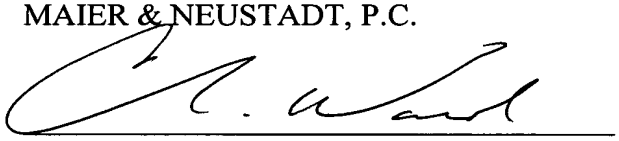

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